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(54) Title: PATTERNED SQUARE CARPET TILES

(57) Abstract: A set of square carpet tiles having omnidirectional patterning, the set comprising at least two tiles with coordinating pattern and color, with each tile having at least two areas of visual texture (31, 32, 33, 34) applied thereto, the areas of visual texture providing the impression of at least two pile directions on each tile. The patterning and texturing may both be done by printing. Also disclosed is a method of supplying the omnidirectionally-patterned tiles.

PATTERNED SQUARE CARPET TILES

This invention relates to patterned square carpet tiles, in particular to a set of patterned square carpet tiles which are interchangeable and omnidirectional and designed to be used together to create a pattern that is larger than the tile.

Patterned square carpet tiles have become common and they are a convenient way to cover floors in domestic, commercial and public buildings.

Modern pattern design is often of an abstract or complex nature. Particularly interesting patterns can now be generated using computer design techniques. The pattern can be transferred from the computer design to the carpet tile by any suitable method, for example dye-injection patterning, tufting or weaving with dyed yarns.

To allow the designer to create patterns larger than an individual tile various design techniques have been used. In one the tiles represent parts of larger pre-arranged design which is then executed by creating and then laying the tiles in a pre-determined way to recreate the original pattern. An example of this is the use of quarter circles on tiles to be used in groups of four to create circles.

An alternative technique to extend the patterning beyond the individual tile is to use an omnidirectional pattern which when laid in a random manner creates a larger pattern, which may never or seldom repeat itself in an installation. Various ways to create tiles with such omnidirectional patterns have been proposed.

In US 5 959 632 the omnidirectional pattern is created by generating a coordinate address which specifies the position in a square tile area where pattern data is to be written for each pixel. A check is then made to determine if the

coordinate address is adjacent any one of sides of the tile area. If so, the position of a pixel is calculated which is adjacent the written pixel on another tile area adjacent the original tile area along that side, and the position of the adjacent pixel when the adjacent tile area is laid on the original tile area is calculated as a shifted position of the adjacent pixel. The positions of the written pixel and the shifted position are rotated by a predetermined angle about the center of a polygon at least once to obtain rotational positions. Pixel values are additionally written at these shift and rotational positions.

In a development of this single tile with a border area concept, which concept allows the tile to be aligned in any of the possible four directions adjacent another identical tile, a set of two or more tiles with different and complementary patterns may be used together using an identical and symmetrical border area as a means to allow the two types of tile to be combined randomly and in any orientation to create a large random patterned floor installation. Such tiles are commercially available from Milliken Industrials Limited.

In copending application GB 0128663.2 there are described omnidirectional carpet tiles, which may be laid and re-laid without regard to their orientation due to their being formed on a pile which is not directional.

WO 02 064 879 describes carpet tiles having patterns and color schemes that obviate the need to orient the tiles relative to each other. The tiles exhibit orthogonal ambiguity, meaning that they may be laid in any side-by-side orientation with respect to adjacent tiles without looking out of place to the ordinary viewer and thereby still achieving an appearance of continuity like broadloom carpet. Each tile has patterns of shapes having some straight sides and that appear to be randomly positioned but oriented with some straight sides parallel to carpet tile sides. The shapes

are formed from a color or combination of colors so that adjacent shapes on each tile have at least one color in common. Furthermore, each tile has at least one color in common with every other tile, so that when the tiles are laid, the colors on adjacent tiles coordinate. All of the colors have similar intensities so that no one color will significantly stand out from the other colors. Moreover, because the pattern on each tile appears to be random, placement of the tiles on the floor in any side-by-side orientation simply creates a larger, apparently random pattern, rendering it impossible for any tile to look out of place.

It is an object of the present invention to create omnidirectional carpet tile patterns that are not restricted by the need for border areas, special pile orientation or color restrictions as required by the prior art. Furthermore it is also an object to create a set of carpet tiles with different patterns that when laid together randomly further increase the effect of having a non-repeating pattern in the carpet tile layout.

According to the present invention there is a set of patterned square carpet tiles, characterized in that the set comprises a least two tiles with coordinating patterns and colors and having at least two areas of visual texture applied to each tile, the areas of visual texture providing the impression of at least two pile directions on each tile. Preferably the pattern is applied to the tiles by printing and the visual texture is also applied by printing. Most preferably the pattern and the visual texture are applied in a single stage printing operation. The term visual texture encompasses all printed patterns and colour/shade combinations which simulate a three dimensional appearance to the tile surface, or add apparent depth to an otherwise flat tile surface, or give enhanced light and shade effects, or add detail to the surface such as would be present if the surface had a conventionally textured surface, or a

combination of these effects. One particularly preferred application of the use of visual texture is to simulate the appearance of natural or woven textures by printing onto the surface of the carpet tile. Advantages of the use of visual texture over conventional surface textures are that the visual texture has better appearance retention during use, as it cannot flatten further. Also the application of texture by printing allows more flexibility in the way that textures may be combined with one another in closely adjacent and relatively small areas of the tile surface. In particular visual texture can be used to create pile effects that are oriented differently from the actual pile of the carpet tile. In one embodiment there may be four tiles in a set and the tiles are designed by taking the pattern of one tile and rotating it through about 90, 180 and 270 degrees to create the four tiles and then applying the visual textures to the patterned areas of each tile. The tiles are made individual and loss directionally significant by the application of the textures. This can be achieved by applying different textures to each tile and by applying at least two directionally significant textures in two orientations so that the four tiles become different from each other and can be turned without this being obvious.

In another embodiment of the invention the set of tiles may include two or more different tile designs and comprises tiles which are designed by creating a set of related tile designs each having a pattern of blocks of at least two colours or shades, which preferably interlock. At least two directionally significant visual textures are then combined with the colours or shades, keeping the original pattern boundaries. A design in which there are two colours, which are then combined with two visual textures, is one variant of this design method. By this incorporation of visual texture having at least two directions in each tile a set of tiles having complex designs are created. When laid these tiles do not require the original pile direction of the tile to be taken into consideration. This allows maximum patterning

flexibility and also allows the tile to be re-laid in a different orientation without this adversely affecting the overall appearance of the installation.

The invention also includes a method of supplying the tiles in boxes of identical tiles and then laying them according to a computer generated pattern code.

Alternatively, the tiles may be randomly packed into boxes after production so they can be laid in the order they are removed from the box. This randomization may also include rotating the tiles so that the pile direction is also randomized.

By use of a tile printing process, such as the Millitron® process it is, in a still further embodiment of the invention, possible to print the four tiles in such a way that they are randomly produced and there is no need to rearrange them as they are packed or used.

The invention will now be described by way of example only and with reference to the drawings of which:

Figure 1 is a tile pattern created using the pinwheel technique,

Figure 2 is a plan view of a graphic pattern suitable for use in the invention,

Figure 3 is a plan view of the same pattern as figure 2 after the texture has been applied,

Figure 4 is a plan view of a set of four tiles after application of texture and in the pinwheel orientation, and

Figure 5 is a plan view of a possible carpet tile installation with random alignment of the four tiles.

The Pinwheel repeat design method, also known as the quarter turn repeat design method, is normally used to create non-directional tile designs by repeating a design in rotated form in the four quadrants of a square tile. If the four quadrants were to be separated from one another then the resulting four half sized tiles would be identical.

Figure 1 shoes how a two by two matrix of repeats is used to create the pinwheel repeat design method. The orientation of the top left quarter 1 is unchanged, the top right quarter 2 is rotated 90 degrees to the right, the bottom right quarter 3 is rotated 180 degrees and the bottom left quarter 4 is rotated 270 degrees to the right. Since the Pinwheel repeat design method rotates the working design, this repeat design method requires that the working design be square, with dimensions half those of the carpet tile.

The invention takes the pinwheel repeat design method and enhances it to create a set of four distinct carpet tiles that, when used in combination, provide a modular carpet installation which has a textural, subtly patterned, appearance. In addition, with this invention, the appearance of the installation is enhanced when the four carpet tiles comprising the set are laid at random within the overall pattern, and when the tile direction is also made random. This is contrary to the norm where the installation appearance is marred if the tile patterns and pile directions are not kept properly aligned.

The starting point for the design process is to create a random, graphic design which will fill a first tile, this graphic is then repeated, but rotated through 90 degrees on the other three quarters, using the pinwheel technique.

Figure 2 shows an example of a suitable random graphic design. In this instance the design contains a large number of lines 21, 22, 23 and 24, which are orthogonal to one another and either parallel to the sides of the carpet tile

or at about 45 degrees to them. The design also contains adjacent areas that contrast with one another 25, 26 and lines 27, 28 that curve to soften the predominant orthogonal lines.

Textural designs, which simulate the appearance of high and low loops, are then overlaid on top of the four graphic designs that have been created by the pinwheel technique. The textural designs have light and dark patterning which suggests a three dimensional texture created by a loop pile. At least two orientations of visual texture are applied to each tile. This means that even if the rotated patterns are put back to the original orientation by a "reverse pinwheel" they no longer match one another.

Figure 3 shows the graphic pattern of figure 2 to which the texture has been applied. Areas of different textures 31, 32, 33, 34 can be seen to be oriented in different directions. When these designs are printed onto carpet tiles the result is a series of four tiles on which the edges do not match from tile to tile. Figure 4 shows the set of four tiles after application of texture and in the pinwheel orientation. Even in this format it is difficult to see where the tiles join. In effect whilst the original design of figure 2 is comprised of geometrical shapes and lines with various shades and colors, the texture adds to that a subsidiary pattern which is orientated with regard to the tile and not the pattern. Because of plural directionality of the visual texture and because the visual texture may be applied individually to the four tiles the four tiles create a monolithic appearance when laid at random, as described below.

To ensure that the tiles are laid at random one or more of the following techniques may be used. The tiles may be supplied in boxes of identical tiles and then laid according to a computer generated pattern code.

The tiles may be randomly packed into boxes after production so they can be laid in the order they are removed from the box. This randomization may also include rotating the tiles so that the pile direction is also randomized.

By use of a tile printing process, such as the Millitron® process, it is possible to print the four tiles in such a way that they are randomly produced and there is no need to rearrange them as they are packed or used.

Figure 5 shows a plan view of a hypothetical carpet tile installation with random alignment of the four tiles, which were depicted in figure 4.

CLAIMS

1. A set of patterned square carpet tiles, the set comprising a least two tiles with coordinating pattern and color characterized in that each tile has at least two areas of visual texture applied, the areas of visual texture providing the impression of at least two pile directions on each tile.

2. A set of carpet tiles according to claim 1 in which the pattern is applied to the tiles by printing and the visual texture is also applied by printing.

3. A set of carpet tiles according to claim 2 in which the pattern and the visual texture are applied in a single stage printing operation.

4. A set of carpet tiles according to any preceding claim having four tiles in the set.

5. A set of carpet tiles according to claim 4 in which the tiles are designed by taking the pattern of one tile and rotating it through about 90, 180 and 270 degrees to create the four tiles and then applying texture to the patterned areas of each tile.

6. A set of carpet tiles according to claim 5 in which the tiles are made individual by the application of different texture to each tile.

7. A set of carpet tiles according to claim 5 or 6 in which the tiles are made individual by applying to each tile at least two directionally significant visual textures in two orientations.

8. A method of supplying the tiles according to any preceding claim in boxes of identical tiles and then

laying them according to a computer generated pattern code.

9. A method of supplying the tiles according to any one of claims 1 to 7 in which the tiles are randomly packed into boxes after production so they can be laid in the order they are removed from the box.

10. A method according to claim 9 in which the randomization includes rotating the tiles so that the pile direction is also randomized.

11. A method of supplying the tiles according to any one of claims 1 to 7 in which the tiles are manufactured by a tile printing process.

12. A method according to claim 11 in which the printing process is a dye injection printing process.

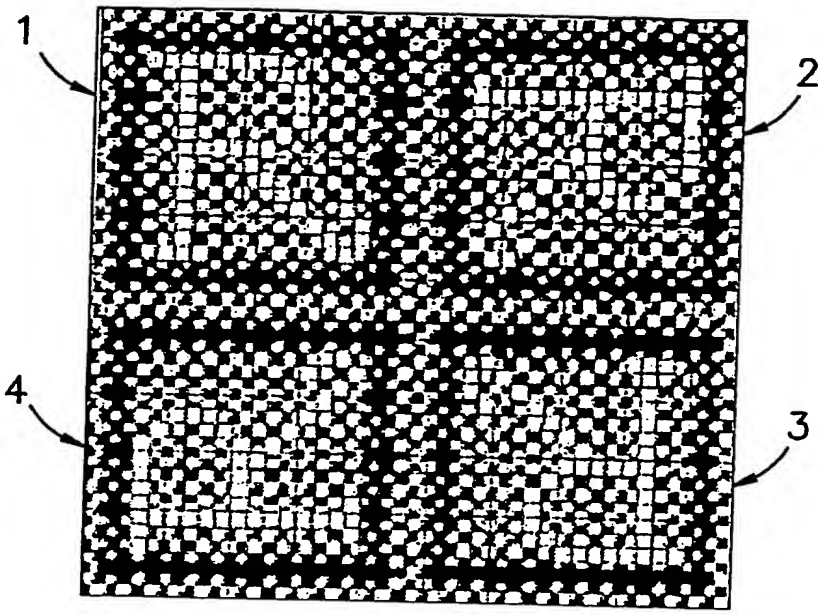

Figure –1–

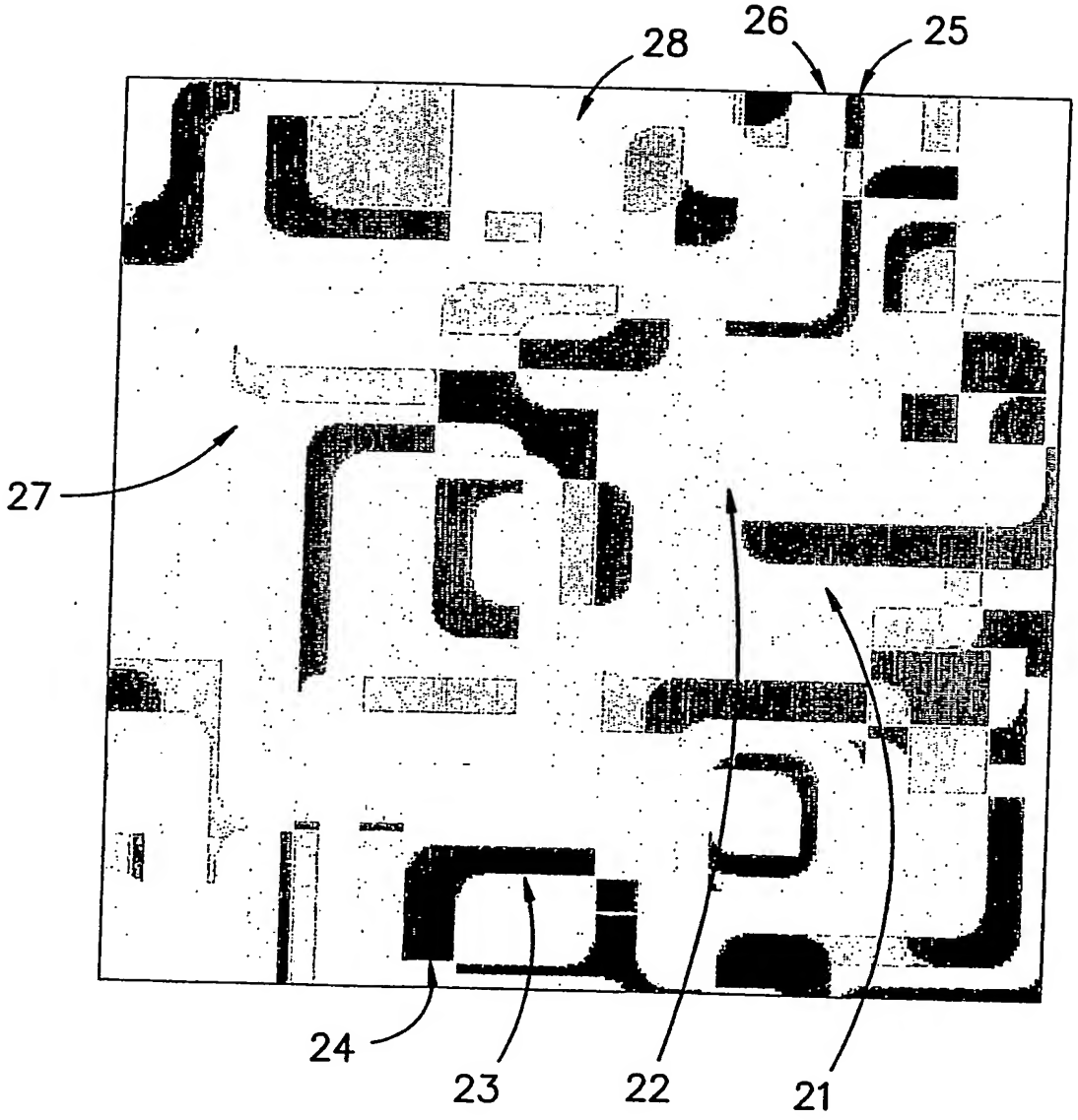

Figure –2–

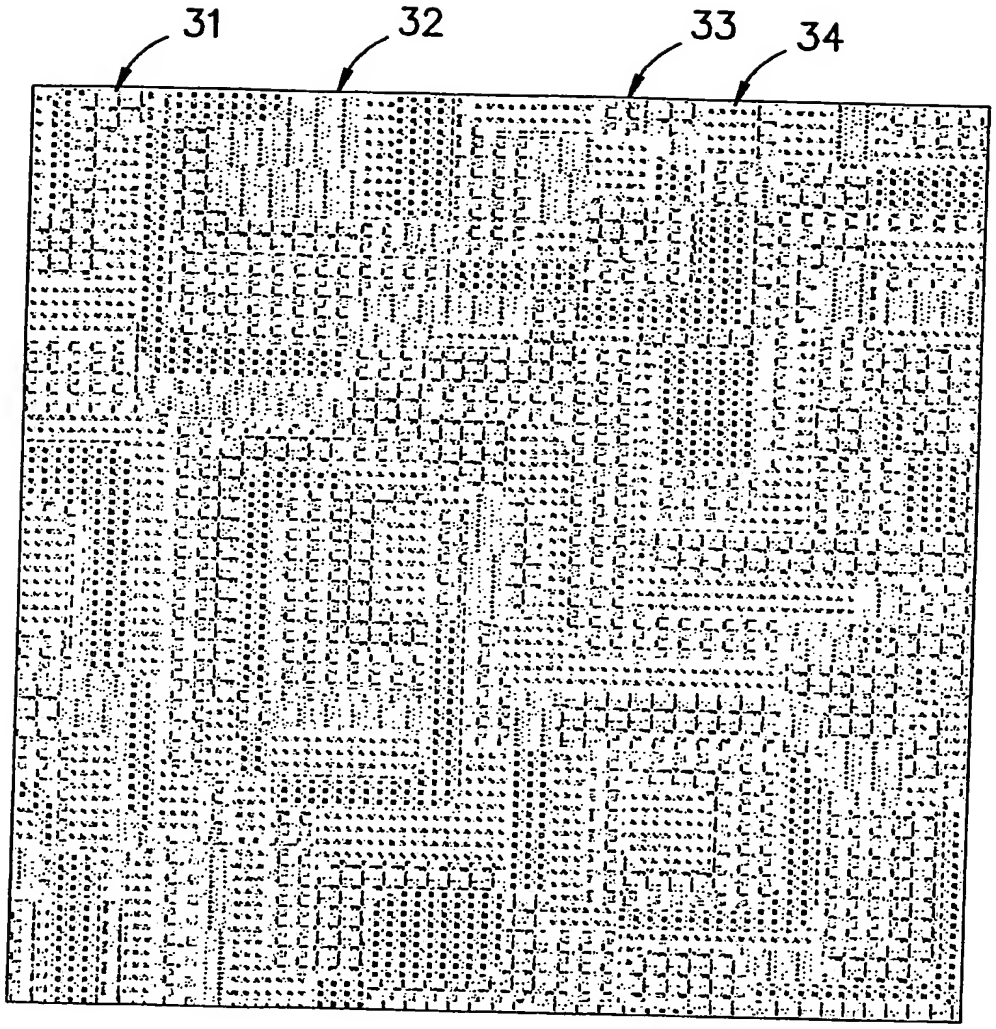

Figure –3–

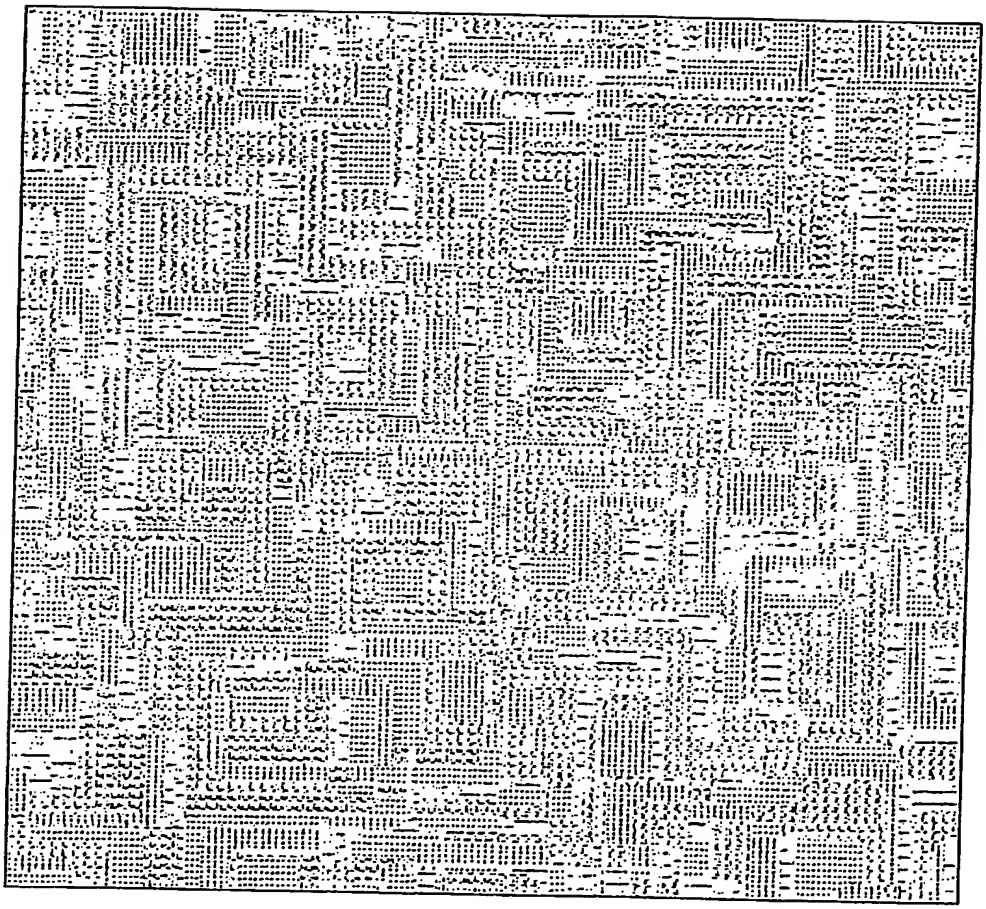

Figure –4–

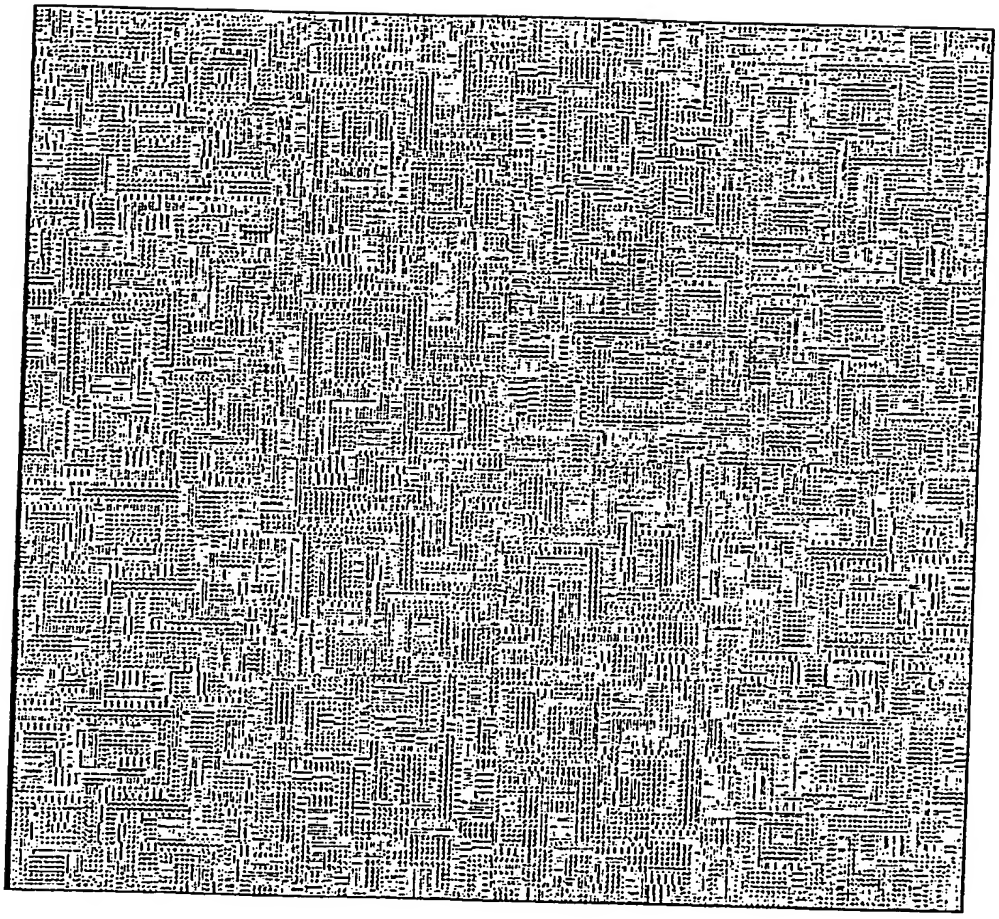

Figure –5–